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of the Royal Agricultural High School of Berlin. The present volume deals solely with the those "diseases" which are due to inorganic agencies, those due to the attacks of parasitic animals and plants being deferred to the second volume. Thus we have nearly one-half of the book devoted to wounds, somewhat less than a third to atmospheric influences, about a sixth to the influence of the soil, while in remaining pages various other agents are discussed. A few woodcuts help to illustrate the text. An English work of this kind would be useful.—

CHARLES E. BESSEY.

Wilson's Atlas of Karyokinesis.⁴—It is the object to this atlas to place before students and teachers of biology a practically continuous series of figures photographed directly from nature, to illustrate the the principal phenomena in the fertilization and early development of the animal egg. The new science of cytology has in the course of the past two decades brought forward discoveries relating to the fertilization of the egg and the closely-related subject of cell-division (karyokinesis) that have called forth on the part of Weismann and others some of the most important and suggestive discussions of the post-Darwinian biology. These discoveries must in some measure be dealt with by every modern text-book of morphology or physiology, yet they belong to a region of observation inaccessible to the general reader or student, since it can only be approached by means of a refined histological technique applied to special objects not ordinarily available for practical study or demonstration. A knowledge of the subject must therefore, in most cases, be acquired from text-books in which drawings are made to take the place of the real object. But no drawing, however excellent, can convey an accurate mental picture of the real object. It is extremely difficult for even the most skilful draughtsman to represent in a drawing the exact appearance of protoplasm and the delicate and complicated apparatus of the cell. It is impossible adequately to reproduce the drawing in a black-and-white text-book figure. Every such figure must necessarily be in some measure schematic and embodies a considerable subjective element of interpretation.

The photograph, whatever be its shortcomings (and no photograph can do full justice to nature), at least gives an absolutely faithful representation of what appears under the microscope; it contains no subjective element save that involved in the focussing of the instrument, and hence conveys a true mental picture. The present work, therefore,

⁴ An atlas of the Fertilization and Karyokinesis of the ovum. By Edmund B. Wilson, Ph. D., Professor of Invertebrate Zoology in Columbia College, New York. Columbia University Press McMillan & Co., 1895.

serves a useful purpose, especially by enabling teachers of biology to place before their students a series of illustrations whose fidelity is beyond question, and which may serve as a basis for either elementary or advanced work in this direction.

The photographs have been taken from the eggs of the sea-urchin, *Toxopneustes variegatus* Ag. (a classical object for the study of these phenomena), taken as a type. The eggs having been cut into extremely thin sections $\frac{1}{1000}$ to $\frac{1}{2000}$ inch.) were stained in iron-hæmatoxylin, and projected by means of the Zeiss apochromatic oil-immersion objective, 2 mm. focus, at an enlargement varying from 950 to 1000 diameters. They have been reproduced *absolutely without retouching* or modification of any kind.

Following is a partial list of the points clearly shown in the present series:—The ovarian egg, with germinal vesicle, germinal spot and chromatin-network; the polar amphiaster with the "Vierergruppen" or quadruple chromosome-groups; the unfertilized egg, after extrusion of the polar bodies; entrance of the spermatozoon, the entrance-cone; rotation of the sperm-head, origin of the sperm-aster from the middle-piece, growth of the astral rays; conjugation of the germ-nuclei, extension and division of the sperm-aster; formation of the cleavage-nucleus; the attraction-spheres in the resting-cell; formation of the cleavage-amphiaster, origin of the spindle-fibres and chromosomes; division of the chromosomes, separation of the daughter-chromosomes; structure and growth of the astrosphere; degeneration of the spindle; formation of the "Zwischenkörper;" origin of the chromatic vesicles from the chromosomes; reconstruction of the daughter-nuclei; cleavage of the ovum; the two-celled stage at several periods showing division of the archoplasm-mass, "attraction-spheres" in the resting-cell, formation of the second cleavage-amphiasters.

The explanatory text comprises a simple introductory account of the general history of the subject (for the use of students and general readers), with a number of figures, mostly original, but a few copied from Boveri. In the descriptive part a more critical description of the photographs is given, with drawings illustrating every stage shown.

The atlas will be of great utility to embryologists and biologists in general, and the execution will satisfy the student, as worthily illustrating the text. The reputation of the author guarantees the accuracy of the work.

A Delightful Book on Butterflies.⁵—In these excursions into

⁵ Frail Children of the Air. By Samuel Hubbard Scudder. Houghton, Mifflin & Co., Boston, 1895. Price \$1.50.